Amendments to the Specification:

Please replace paragraph **[0021]** with the following amended paragraph:

[0021] These cyclic events are dynamic in nature and involve weapon mechanical components that are abruptly urged to displace from an intial rest state by a round discharge event, and following a cycle of operation, ~~collide, change direction or arrive to a rest position, etc.,~~ , arrive slamming into an abrupt stop in a limit home position as a new round is chambered and as the weapon becomes enabled to start another cycle. This activity is initially driven by certain amount of energy~~, which is originally~~ derived of the explosive content of the actual round being discharged, being the return portion of said cycle, aided by the automatic round reloading driving provisions of said weapon.
Upon operating said weapon, the combined effect of moving component collisions with the abrupt acceleration and deceleration which these undergo, generate dynamically sizable and well defined reports that are in substantial synchronicity with the beginning and the end of said weapon mechanical cycle of operation.

Please replace paragraph **[0021.1]** with the following amended paragraph:

[0021.1] The components that are actuated, vary somewhat according to weapon designs and substantially according to weapon type, nonetheless, a cycle of dynamics of discharge and reload is always present, with different duration, different amounts of energy, different mechanical structures being involved, but always present and their duration is linked to the weapon net rate of fire. By properly coupling an adequate form of detecting means adapted to generate electrical impulses from dynamic stresses induced unto said detecting means by said weapon's dynamic activity, sets of pulses representative of ~~the~~ these peak dynamic ~~cyclic~~ events taking place while discharging or discharging and reloading, or reloading combined with automatically discharging of a round could be tracked. Furthermore, by understanding the .

nature and the physical properties of the typical cycle of the dynamic mechanical activity of the weapon in which ~~this~~ said detecting means is adapted, ~~the electrical pulse sets generated as described~~ higher level electrical pulse sets detected in this manner, can be identified as to correspond to abrupt acceleration or deceleration and structural shock and vibration events taking place in substantial synchronicity with the actual discharge of a projectile or when the reload provisions of said weapon return to a striking stop whilst chambering a new round. Consequently, these detected higher electrical pulse sets, could be logically interpreted as being representative of these particular events, ~~activity event,~~ subsequently correlated, and said information used for further tracking purposes.

Please delete paragraph **[0022]**.

Please add the following new paragraph after paragraph **[0021.1]**:

[0022.1] This method utilizes an electrical pulse generating detecting structure in combination with a tracking means. Said tracking means comprising a programmable controller assembly including timing provisions and capable of storing and running at least one program, which in turn includes, asides from its supporting power resource and circuitry, the corresponding electrical and logic implementation required to identify, interpret and determine the nature of an event or events detected. Presets embedded in the tracking software aiding in this determination may include as needed, data of parameters representing the weapon net rate of fire, the weapon full cycle time, partial cycles times, signal thresholds, and others, as well as, if required, the possiblility of selecting differet presets of the same for providing some degree of adjustment to accomodate possible variations of these paramenters in real life application. Further adaptability is possible for certain cases also, by acquiring full cycle timing presets from the same weapon while discharging rounds on automatic mode, by a simple software implementation adaptable to the same assembly. By enabling recording of the periodicity of the pulse pattern sequence induced in the detector by discharging a test sequence of rounds, a custom cycle

timing preset is thusly easily acquired and then loaded for use on the system. This stems from a well used practice on systems like the present one, that can utilize their own sensor feedback for establishing their fuctional limits from a test run. A basic tracking configuration utilizes per cycle tracking provisions that correlates the time of occurrance of detected higher electrical impulse sets, with peak dynamic events typically contained within a cycle of operation of said weapon. Mechanical provisions on a weapon operate following a pattern and a cycle having intensities and substantially consistent time duration between events that is characteristic to said weapon. Said tracked peak dynamic events follow a logic sequence and time frame of occurrance linked to the weapon cycle of operation. Tracking events within a cycle is then possible by tracking the prescence or abscence of detected higher impulse sets within the tracked cycle time, and logically interpreting the results by correlating the results to the presets. Further translating this information into a global track that tracks a count discharge events is then easily implemented for tracking general weapon activity. Tracking of continuos cycle repetitions as those detected when discharging a weapon in full automatic mode can also be easily implemented since the reload and discharge events are closely integrated into one dynamic event as they take place substantially simultaneously. Consequently, tracking the periodicity of the the detected events is then used to ascertain that said weapon is being discharged automatically as the detected electrical impulse sequence is found to closely correlate to the presets representing the weapon's net rate of fire. When this is established, then the tracking system will track count of said events as one discharge and reload per event.

Please replace paragraph **[0025.1]** with the following amended paragraph:

[0025.1] The possibility that by the use of an adequately adapted detecting means in combination with a tracking structure having ~~substantial~~ provisions to identify if a round has been discharged and reloaded automatically, if the round just discharged was the last one of that particular load or if a round <u>that</u> has just been chambered ~~, provides great advantage for correctly recording real-time events and reporting~~

~~to the user, of a load of ammunition depletion process, furthermore if this results in a simpler and easier to implement solution.~~ is still contained within said particular load count, provides the great practical advantage for correctly tracking ammunition expenditure on a per load basis, since the capability of recognizing the discharge of a last round of a load, a count reset is then correctly performed, automatically enabling tracking of a new load, from the default load count preset. As a result, since a load has a quantitative specification, and there is a begining and and end to its discharge, linking reports regarding its changing status, becomes an easy implementation. Needless to say, support for recording of round discharge history using basically the same functional structure is easily accomplished.

[0026] The present invention is directed to an assembly for use on a firearm, and more particularly, to a weapon usage detecting and tracking device which may include provisions for activating signals aimed to provide to the user with perceivable reports regarding a weapon's ammunition load status.

[0027] Said usage detecting and tracking structures combine also with a real time clock and memory provision to record firing events for future download.

Please add the following new paragraphs after paragraph **[0027]**:

[0027.1] In consideration of this not being limiting, the required preferred embodiment of the present invention is an example form depicting also how an assembly like this lends itself to be so compactly built that fits into such a small component of said weapon. This is an innovation that brings upon a solution that is highly adaptable and versatile, since weapon structural shock and vibration as well as abrupt acceleration changes are widely tangible throughout most of the weapon assembly as it is operated, and a detecting and tracking structure could be successfuly adapted in any of multiple locations of said weapon. In addition, the minimal footprint required for this solution, lends itself for a variety of embodiments that could suit successfuly different

weapon topologies and components in which this could be adapted. In this case it is shown as it is built into a casing that is nested on the firing pin cover plate well on a striker pin type of automatic weapon, while replacing said firing pin cover in functionality also. Visible indicators exemplified are disposed in the proximal end of said casing and visual changes taking place on said indicators responsive to the tracking means, are conveniently located for they be visible by the user.

[0027.2] The same approach of practical adaptation of this invention into components also serving functional purposes of said weapon, result on several embodiments that could adopt a variety of forms, such that while being embedded in an structure that is used as part of a weapon, they also allow for adequate dynamic event tracking and the installation of adequately visible indicators. Just to list some of the most relevant, a gunsight that while functioning as such, also reports ammunition status information. For an example of this, we will refer to the inventor's prior U.S. Patent #5,735,070 titled Illuminated Gun Sight and Low Ammunition Warning System in which the single color light sources are replaced with now widely available and highly compact surface mount multicolor leds. Utilizing the same sighting visual indicia structure, reports to the user regarding ammunition status information are enabled by simply applying color or visual pattern changes to said visual indicia. In this case, the location is also adequate for installing the detecting means and the compactness of this solution lends itself be easily built into such assembly while visual indicators are also conveniently located for the user. Another form could also be a scope sight adapted with an lcd reticle displaying a bar stack that varies visually, or the same containing color changing internal luminous features, etc. Several other forms also fall within the category wherein a component that is integral or retrofittable to a weapon can also house said system due to the compactness of the assembly and the fact that shock, vibration, and acceleration changes could be detected throughout a weapon structure and some form of visual report could also be implemented.

Please delete paragraph **[0028] and [0029].**

Please replace paragraph **[0030]** with the following amended paragraph:

[0030] ~~Internally included,~~ Comprised in the assembly, are a power source, a simple ~~but~~ and condensed programmable controller circuit ~~in sleep mode by default~~, and properly adapted detecting means with optional signal conditioning supporting circuitry. Externally accessible is at least one programming and reset control means, adapted to alter presets in said programmable controller, or to perform a reset operation. Alternatively, access provisions to removably attach the required form of control means could obviously be implemented for further control enhancements or to achieve a more compact assembly.

Please replace paragraph **[0031]** with the following amended paragraph:

[0031] The fundamental single detecting device preferred version is based on an adequately adapted piezoelectric detecting device generating ~~a~~ an electrical pulse pattern in correlation to the dynamically induced ~~sequence of~~ stresses occurring when said weapon is actuated.

Please replace paragraph **[0031.1]** with the following amended paragraph:

[0031.1] An alternate form combines with a second slide home default position detecting component which in turn could be a ~~switch~~ switching provision that reports a slide breaking away from said home default position by either deriving electrical flow or interrupting a circuit. It can perform also as a programming level selecting device in the case of a highly compact installation. A piezoelectric component that generates an electrical pulse when departing or returning to said home default position optionally can be used to act as a double certain detector for a last shot fired in combination an assembly that utilizes an inclination or tilt event detector.

Please replace paragraph **[0031.2]** with the following amended paragraph:

[0031.2] According to the design criteria of the particular embodiment being implemented, for activating the device, a master power switch, automatic power up provisions, or a combination of both could be obviously adapted. Power conservation means possible, include commonly used practices of activating and enabling tracking activity from a lower power sleep mode wait state upon the occurrance of an electrically detectable event, programmed furthermore to return to said sleep mode wait state upon completing an activity cycle. ~~The assembly supports~~ Depending on the number of leads available of the microcontroller utilized, multiple signal reporting means and signal patterns with duty cycle controls for said signals or power conservation energizing patterns could be easily implemented, and related embedded presets can be selectively recalled by a control means, allowing certain degree of signal customization. ~~, and real~~ Real time firing events history recording options by means of ~~proper~~ minimal software and hardware adaptation ~~implementation~~. is also a useful functional expansion.

Please add the following new paragraphs after paragraph **[0032]**:

[0032.1] The event detecting viewed in more detail, is resolved by an adequately coupled piezoelectric detecting means generating electrical pulse sets whilst undergoing stresses induced by the dynamic activity of the weapon being operated. Said electrical pulse sets contain electrical impulses of varied magnitude comprising within, higher level portions of impulses that are correlated in time with moments comprised within the operating cycle that are characterized by their higher dynamic intensity.

[0032.2] For a particular type of weapon, each type of activity has certain dynamic characteristics, and the succession of dynamic events that take place follow a certain logical order and moment in time they occur within said weapon cycle. An operating cycle is typical to each type of weapon, and weapon activity of a particular type of weapon can be represented by an electrical impulse sequence equivalence as this is reported within said weapon operating cycle time frame by the detector to the tracking means. Hence, typical higher dynamic events

timing parameters characterizing a particular type of weapon operating cycle, that are contained as presets and logic operators within the tracking means are used to ascertain if said weapon has been discharged, discharged and reloaded or manually operated.

[0032.3] The very first portion of the event corresponding to discharging a round, induces on a detector intense stresses as a consequence of the abrupt rearward acceleration occurring in reaction to the projectile being propelled forward and then exiting the barrel. Structural shock and vibration that are also inherently present at this same time as a consequence of the actual explosion of the charge acting against the moment of inertia of the structure and by inducing collisions of weapon component stacks, and thusly cooperate concurrently on inducing further more stresses on said detector. Depending on the type of detector and its adaptation, one or another part of the physical phenomena will cooperate in greater measure in generating the higher pulse set reporting this event. Needless to say that detector placement and installation, have to include considerations to limit potentially destructive excessive shock and high fequency vibration generated when descharging a round.

Please delete paragraph **[0033]** and **[0033.1]**

Please replace paragraph **[0033.2]** with the following amended paragraph:

[0033.2] An adequately adapted piezoelectric detector, properly coupled to the weapon will in this case report a proportionally intense electrical pulse set in correspondance to the induced stresses. ~~sharp spikes with quick decays and adapting a detector adequately~~ Adequately adapting a piezoelectric detector for achieving the best trackable reports may include aside from detector type selection, ~~material choice,~~ proper encasement, mechanical and electrical filtering and signal conditioning, all working cooperatively in order ~~as~~ to keep unwanted resonance reasonably low. In this way the decay of the detector report is kept substantially prompt and closely trailing to the most relevant dynamic

events that ~~are taking place in close succession.~~ take place within the weapon operating cycle.

Please replace paragraph **[0033.4]** with the following amended paragraph:

[0033.4] During this rearward displacement, remnant vibration from the discharge event tapers off and low level friction activity is present, which still clocked, but deemed irrelevant, and in practice, like would be done for optimizing an electrical impulse tracking operation, filtered or squelched, since the system is then seeking for the presence or absence of higher magnitude events that would occur only in expected moments in time ~~logical time windows of~~ within a particular weapon typical mechanical operating cycles.

Please replace paragraph **[0033.5]** with the following amended paragraph:

[0033.5] When the rearward cycle portion ~~approaches and~~ reaches its end, another pulse segment occurs which is representative of this bottoming event, in which for an instant in time, the slide is stopped completely and then reverses its travel direction. This signal portion ~~can be~~ is typically of much lower magnitude than the first discharge portion in view of the weapon recoil absorbtion provisions having dissipated most of the energy from the discharge, and ~~this is mostly related~~ its report if detected while being of much lesser magnitude than those generated by the discharge or reload events, varies somewhat depending to the type of weapon and detector installation. In the case of a recoil type handgun ~~with a detector mounted on the slide~~, a stiff frame type weapon reports a higher magnitude and tighter report pattern opposite to a composite frame weapon that presents certain resiliency further cushioning the end of the rearward stroke. On some types of weapons of different design, more specifically those of the type that have an internally reciprocating bolt, a detector and the tracking system can be adapted to read this portion of the discharge event in the case in which this is more fitting for accurate tracking.

Please replace paragraph **[0033.6]** with the following amended paragraph:

[0033.6] Providing there is another round available from the load, a reverse direction displacement automatically then takes place, and the slide portion of said weapon starts a return travel aided by the force of the slide spring, inducing as it travels also another set of pulses basically due to vibration induced by friction and other activity, like dragging a new round out of the clip. Even though this signal trail falls within the tracked cycle time which is all along clocked, these sets of pulses ~~could be~~ are disregarded or filtered off or also squelched ~~as it could be done~~ as it is typically done to remove background noise in parallel applications ~~for practical purposes~~. At the end of this displacement, the slide reaches the home position colliding at substantial speed with the supporting structure front limit as it is also urged to decelerate abruptly while chambering a new round, consequently inducing the detector to report another high pulse portion set as it finalizes the cycle arriving to ~~resting nested then in~~ a new fire ready state.

Please replace paragraph **[0033.7]** with the following amended paragraph:

[0033.7] This structural collision and abruptly stopped motion combination induces substantial stress in the detecting means which in turn generates proportional electrical pulses of equivalent nature. This pulse portion is typically, as determined by test and experimentation, only second in intensity to the one induced by the projectile being propelled outwardly and it takes place within an expected time frame, said time frame substantially corresponds to the end portion of what a typical cycle duration that a discharge and reload event ~~will last in~~ of a particular weapon.

Please add the following new paragraph after paragraph **[0033.8]**:

[0033.8.1] The discharge of a round and the reload activity of a weapon, generate electrical pulses that are distinct as they are higher in magnitude of those generated by other portions of the weapon cycle. They are identifyable electrically by their magnitude, but also they occurr in a timing linked to the weapon cycle since they take place at known moments within the weapon automatic cycle. The first one, the one generated at the actual discharge of the projectile, is

substantially synchronized with the beginning of the weapon said automatic cycle, and the second one is also substantially synchronized with the final part of said cycle which is rechambering of a new round. Detecting said first event triggers the cycle tracking process into activity which will go on for a period of time, seeking for a second high magnitude report that is known to take place within the time the weapon mechanical provisions will take to complete the cycle as a new round is chambered. Subsequently, if said second electrical report takes place as expected, the tracking system acknowledges the tracked cycle as a complete one comprising a discharge and a reload, and if this second high magnitude signal does not take place within the time frame of the tracked cycle, the system acknowledges said tracked cycle as an incomplete one that comprises a discharge but did not included a reload. By utilizing this tracking logic foundation, this system is able to differentiate between a round discharged being still part of a load or it being the last, since in the latter case it will actually track a discharge not followed by a reload. By default, clip count is a known paramenter. The weapon, as it uses up a load, will generate a succession of complete cycles until the last round is discharged. Tracking against the load count allows to generate signals correlated to changing load resources, and the last round incomplete cycle report, asides it being tracked as a discharged round, is used for resetting the load tracking to the default count again. Alternatively, if a weapon is being discharged on full automatic mode, tracking is made possible by tracking the periodicity of the reports as taking place in a repetition equivalent to the weapon known automatic rate of fire.

Please delete paragraph **[0033.9]**, and **[0033.10]**.

Please replace paragraph **[0034]** with the following amended paragraph:

[0034] In variations of the system, a switching device could be used in combination for establishing that the slide has abandoned the home position or has returned. In a similar fashion as pictured on the inventor's ~~my~~ prior patent #5,735,070 titled Illuminated Gun Sight and Low Ammunition Warning System For Firearms, in which a contact is established or broken upon the

slide of the weapon arrives or departs from the home position, in this case, said switching device could be of the normally closed or open type and is mounted on the assembly adequately disposed as to be urged into "off" or "on" mode whilst the slide is at the home position and said switching device detecting member is bearing in interference against a mating portion of the weapons frame. An adaptation of a film piezoelectric component that will produce a pulse on arriving to the home position could also be utilized to indicate the moment of return of the slide to the closed position.

Please replace paragraph **[0045]** with the following amended paragraph:

[0045] A basic example of a ~~The~~ luminous warning system, though not limited to this form only, is implemented by utilizing ~~based on~~ a plurality of colored or multicolored indicators that become selectively illuminated ~~every time a round is discharged~~ in a relation with the load being discharged. While starting in one particular color,~~. As~~ as the depletion progresses, at ~~a set point~~ set points, the signal changes to another color raising the alert level and will ~~repeat~~ continue in this manner, increasing the warning report to the user until the last level is reached.

Please replace paragraph **[0046]** with the following amended paragraph:

[0046] For descriptive purposes, we will ~~describe the total number of signal pulses per color~~ correlate three color changes reporting increasing levels of warning ~~level as a~~ as signal ~~stack~~ stacks making a parallel to ~~a stack~~ the stacks of rounds they represent.

Please replace paragraph **[0050]** with the following amended paragraph:

[0050] In the preferred embodiment of this invention, the total available rounds per load are divided into three stacks; each one corresponds to an alert level. A first amount, being at a level of first alert, a green light is enabled whilst discharging this stack. Once this stack is spent, as the

second alert level, a blue indicator is enabled ~~for each~~ in relation to the discharge of this stack. In this case a blue indicator as opposed to a yellow one is ~~used~~ indicated due to the fact that a yellow like color easily blends with a muzzle blast in twilight or dark. Following will be the last stack that will then be represented by a red colored light, which is the last and the most immediate action prompting signal.

deleted before:[0054], [0055], [0056], [0057], [0058], [0059], [0060], [0061], [0062], [0063], [0064], and **[0065]**

Please replace paragraph **[0072]** with the following amended paragraph:

[0072] For fixed on board memory provisions, communication means are provided on the assembly as to allow access with a properly adapted external means to the data stored on said memory provision. The memory provision could be conveniently adapted to record events in a successive manner such that when its storage capacity is reached, it will handle the next data input by overflowing and eliminating the oldest events previously stored. The memory storage access means of choice in this embodiment, though not limited to this particular topology, is of the I2C serial type device. This type of interface allows operation with a minimal amount of connectivity and its streamlined protocol is sufficiently fast for this application. Removable memory media provisions would be an obvious adaptation that could become evident to those versed on the circuit design trade if this approach is deemed more convenient. In such case, the prescribed memory access and subsequently related provisions will not be required to be built in as disclosed, but alternatively the same universal concept or similar could apply to an external properly adapted reading device.

Please replace paragraph **[0074]** with the following amended paragraph:

[0074] User and weapon specific parameters, like total load count, establishing at what remainder

number of rounds a luminous signal change will occur, a first load extra count in case the user prefer to carry a first shot chambered like most police officers do, a preview or demonstration mode to verify the count and the signal pattern or a reset to default, are all easily keyed in among others, by the user straight into the device via the program and reset switch without any supplementary equipment or accessory. Further implementations are also possible and quite simple to accommodate, like providing a point of access for an external ~~switch~~ detachable multiple control switch assembly containing a plurality of switches for enhanced preset and parameter selecting options. Another form of switching means considered as a convenient accessory is one ~~that in turn can be~~ adapted in a structure that slip temporarily over the weapon trigger, and adapted to mimic the discharge events signal, making it possible to train without live ammunition by allowing to virtually play back a load stack discharge for previewing the currently running signal pattern.

Please replace paragraph **[0075]** with the following amended paragraph:

[0075] It is a primary object of this invention to provide to the user of a weapon with an assembly adapted to said weapon capable of reporting ~~ammunition discharge by the use of luminous~~ by means of visual indicators and a signaling method ~~to be used in the same that will provide the means for a user to receive~~ trailing feedback ~~of~~ correlated to his ammunition ~~expenditure~~ load status, offering to said user the opportunity to become conditioned to react and act safely in view of a ~~luminous~~ percievable signal or percievable signal change whilst using said weapon, in no different way that an automobile driver becomes conditioned to react to a luminous warning signal whilst driving in a city with luminous traffic signals in which a particular light color has an established, furthermore, a subconsciously engraved significance in aiding said driver to make safe decisions accordingly.

Please replace paragraph **[0077]** with the following amended paragraph:

[0077] It is a further object of this invention to provide the advantages described in this application, on a low cost and extremely compact assembly that lends itself to be embedded or easily adapted to a weapon, or encased in a component structure in such manner ~~so~~ that it can interchangeably replace an original component of said weapon, providing to the user with the benefits of this system in addition of it fulfilling at least the function of the component it replaced.

Please delete paragraph **[0079] and [0080]**.

Please replace paragraph **[0081]** with the following amended paragraph:

[0081] It is a further object of this invention to generate a dated and timed weapon discharge record, and furthermore, ~~as the result of the downloading data from a weapon,~~ a secure digital document that will represent accurately the use history of a particular weapon.

Please replace paragraph **[0121.1]** with the following amended paragraph:

[0121.1] Fig 15 is a pulse set acquired from a firing and reload sequence from a composite frame recoil operated handgun in which 91 is the electrical portion resulting from the actual discharging of the round, 92 is the moment of inversion of the slide motion at the end of the recoil, and ~~92~~ 93 is the collision of the slide against the forward limit stop of the return stroke.

Please replace paragraph **[0121.2]** with the following amended paragraph:

[0121.2] Fig 17 is a pulse set acquired from releasing the slide from a hold open position where the slide spring is preloaded and said slide returns to home propelled by said spring as it drags and chambers a new round from a clip. Segment 93 is generated by the abrupt deceleration and collision of the slide against the home stop.